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VALVEMATE®
Valve Actuator
User's Guide

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December 2002

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Declaration of Conformity

Application of Council Directives:

89/336/EEC, 73/23/EEC

Standards to which Conformity is Declared:

EN61326, EN61000-3-3, EN61000-3-2, EN61010-1

Manufacturer's Name ..... Gilson, Inc.

Manufacturer's Address ..... 3000 W. Beltline Highway
Middleton, WI 53562

EC Office Address ..... Gilson S.A.S.
19 Avenue des Entrepreneurs, B.P. 145
F-95400 Villiers-le-Bel, France

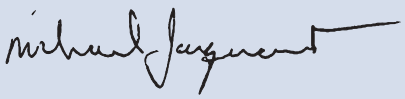
Type of Equipment ..... Laboratory Equipment

Model. ..... **VALVEMATE® Valve Actuator**

Beginning with Serial Number: **330K0A207**

Month and Year of Manufacture: **October 2000**

I, the undersigned, hereby declare that the equipment
specified above conforms to the above Directives and Standards.



Place: Middleton, WI (USA)
Issue Date: March 1997

Michael Jacquart
Senior Vice President
Corporate Technology Development

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Introduction 1

Description

The Gilson VALVEMATE® Valve Actuator provides automatic rotation of a 2-position or multi-position, low- or high-pressure valve.

The VALVEMATE provides automatic valve rotation through the use of the front panel, contact closures, RS-232, or Gilson Serial Input/Output Channel (GSIOC).

Modes

The VALVEMATE has the following modes:

Position mode. This mode identifies the valve type and its current position. When you turn on the VALVEMATE, it will be in this mode after the initial startup screens are displayed. You can change the valve position by pressing the up or down arrow key on the front panel.

Unit ID mode. You use this mode to view and modify the identification number assigned to the VALVEMATE.

Baud rate mode. You use this mode to view and modify the communication rate between the VALVEMATE and a controlling device.

Valve mode. You use this mode to select the type of valve installed in the VALVEMATE.

Service mode. This mode identifies the number of times that the VALVEMATE has rotated the valve and the number of hours that the VALVEMATE has been in operation.

Display

All status, parameter, and error codes appear on the front panel display.

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Unpacking

Unpack the VALVEMATE and its accessories carefully from the carton.

Check the contents with the list below. Do this now, even if the VALVEMATE will not be used immediately. Many carriers must receive concealed damage claims within seven days of delivery.

- VALVEMATE module with appropriate valve installed (if the valve was ordered along with the VALVEMATE)
- GSIOC control cable
- 4-pin terminal block connector
- 7/64" Allen wrench
- fuse drawers and fuses
- 115V and 220V power cords

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Customer Service

Gilson, Inc. and its worldwide network of authorized representatives provide customers with the following assistance: sales, technical applications and instrument repair.

If you need assistance, please contact your Gilson representative or if you are in the United States call the Gilson Customer Service Department at 800-445-7661 or 608-836-1551. You can also contact the Customer Service Department via its e-mail address: service@gilson.com. Specific contact information can be found on the Gilson web site at www.gilson.com. To help us serve you quickly and efficiently, please refer to the **Before Calling Us** section on page 5-5.

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Technical Specifications

Warning: Changes or modifications to the VALVEMATE not expressly approved by Gilson could void the factory-authorized warranty.

The VALVEMATE has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC commercial environment. The VALVEMATE generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of the VALVEMATE in a residential area is likely to cause harmful interference; in which case, the user will be required to correct the interference at his/her own expense.

Shielded cables must be used with the VALVEMATE to ensure compliance with the Class A FCC limits.

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Technical Specification	*Definition*
Available valves	Rheodyne 7000, 7010, 7030, 7040, 7060, 7610, 9010, 9030, 9060, 5011, 5012, 5031, 5032, 5041, 5042, 7710, and 9710 Hamilton 86905, 86913, 86915, and 86918
Contact control	Two contact closure inputs for moving the installed valve
Display	Two 16-character lines; backlit LCD
Environmental conditions	Indoor use Altitude: up to 2000 m Temperature range: 5°–40°C Air pressure: 75–105 kPa Pollution degree: 1 or 2, in accordance with IEC 66 Humidity: Maximum relative humidity 80% for temperatures up to 31°C, decreasing linearly to 50% relative humidity at 40°C
Front panel	MODE key, up arrow key, down arrow key, LED display, and LED indicator lights for Remote and Power
Manufacturing standards	Safety certification: • UL 3101-1 • CSA C22.2 —No. 1010.1-92 • EN 61010-1 EMC certification: • EN 61326 • EN 61000-3-2 1995 • EN 61000-3-3 1995 • FCC Part 15

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Modes	**Position** mode identifies the installed valve, its current position, and the number of positions available **Unit ID** mode identifies the identification number assigned to the VALVEMATE; the default is 35. **Baud rate** mode identifies the communication rate (9600, 19200, or External) between the VALVEMATE and a controlling instrument **Valve** mode identifies the installed valve **Service** mode identifies the number of times the valve has been rotated and the number of hours that the VALVEMATE has been in use
Physical space requirement	12.7 x 39 x 15 cm (5.0 x 15.4 x 5.9 in.)
Power requirements	Frequency: 47 to 63 Hz Voltage: 100–240V (Universal Input) Current rating: 1.0A for 100–120V or 0.5A for 220–240V Power consumption: 100W maximum
Software control	RS-232 and Gilson Serial Input/Output Channel (GSIOC) and Gilson control software
Valve switching speed	No more than 100 mS from position-to-position For a 6-position valve, switching from position 1 to position 2 will take up to 100 mS and switching from position 2 to position 3 will take up to 100 mS. Therefore, the total switching time between position 1 and position 3 would be no more than 200 mS.
Weight	5.8 kg (13 lbs.)

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Installation 2

This section takes you through the steps for setting up your VALVEMATE Valve Actuator.

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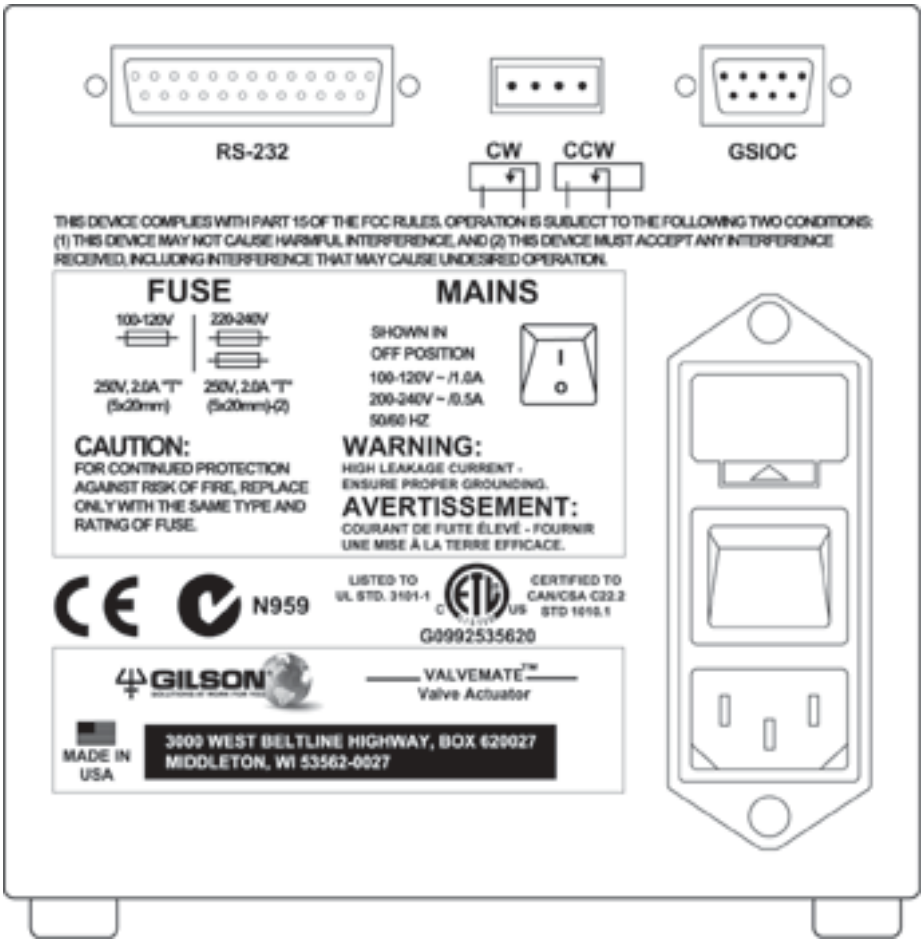
Electrical Setup

Electrical connections are marked on the VALVEMATE's rear panel.



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Fuse Installation

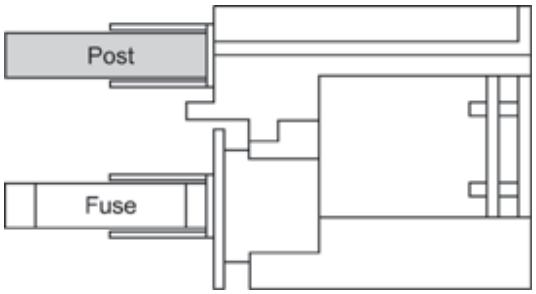
You receive the VALVEMATE without any fuses installed.

1 Locate the accessory package containing the fuse drawer appropriate for your line voltage. Discard the other fuse drawer.

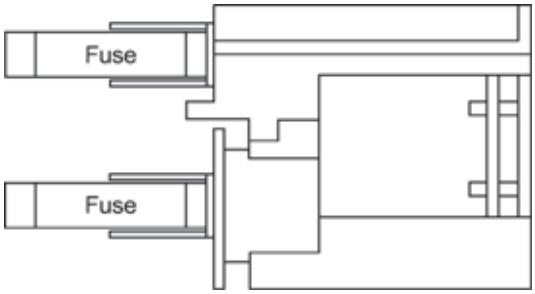
2 Locate the accessory package containing the 2.0 amp fuses.

3 Install the fuse(s) into the fuse drawer. The fuse drawer for 100/120V accepts one fuse. The fuse drawer for 220/240V accepts two fuses.

4 Insert the fuse drawer into its receptacle in the VALVEMATE. See rear panel diagram on page 2-2.



Fuse drawer for 100/120 voltage selection



Fuse drawer for 220/240 voltage selection

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Power Cord Connection

Locate the appropriate power cord for your line voltage. Discard the other power cord.

Use the power cord to connect the VALVEMATE to an AC power source.

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Contact Connections

The VALVEMATE contains two input contact pairs and a removable terminal block connector for easy wiring. The inputs are labeled for quick identification.

Input contacts

Via the input contacts, the VALVEMATE can receive signals to turn the valve in a clockwise (CW) or counterclockwise (CCW) direction.

When controlling the VALVEMATE via the input contacts, send pulse signals. These signals momentarily close (activate) and open (deactivate) a contact. The duration of the pulse must be at least 0.1 second.

Items you will need

To make connections to the input and output contacts, you need:

- a wire insulation stripper
- a small blade screwdriver
- a 2-conductor cable for each connection that you will make

You can purchase a 6-foot piece of suitable cable (part number 709910206) from Gilson.

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Making connections

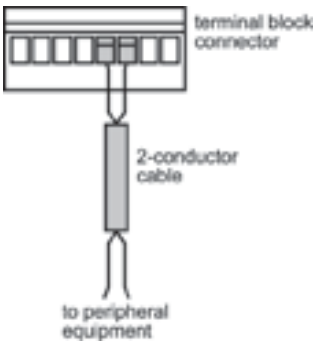
To prepare the cable for each connection, do the following:

1 Cut the cable into pieces of appropriate length; then strip about 0.25 cm of insulation from each end.

2 Insert each wire into the appropriate slot on the terminal block connector. Push each wire all the way in; then tighten its corresponding pin screw.

Note: Be sure to maintain the correct orientation of the terminal block connector relative to its receptacle on the rear panel.

Attach all wires before joining the terminal block connector to its receptacle.



3 Insert the terminal block connector into its receptacle with the wires facing up and the pin screws facing away from the device. Push the connector in as far as it will go. It fits snugly into its receptacle.

4 Connect the opposite ends of these wires to the appropriate peripheral equipment. Be sure to match GND connections.

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RS-232 Connection

The VALVEMATE's RS-232 port is used to transfer information between the VALVEMATE and a computer. For the location of the RS-232 port, refer to the diagram on page 2-2.

To connect your computer to the VALVEMATE, you need an RS-232 cable. Obtain a cable with D-connectors that are appropriate for the VALVEMATE and your computer. The VALVEMATE requires a 25-pin male D-connector. Refer to the back panel of your computer or its documentation to determine which type of D-connector it requires. RS-232 cables are available from Gilson and your local computer store.

Connecting RS-232 cable

Attach the male end of the RS-232 cable to the RS-232 port located on back panel of the VALVEMATE. Tighten the retaining screws.

Attach the other end of the RS-232 cable to the computer's RS-232 serial communications port. Again, tighten the retaining screws.

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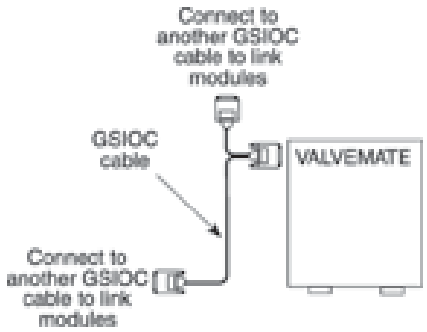
GSIOC Connection

If your VALVEMATE is part of a Gilson system, use the GSIOC port to connect the VALVEMATE along the Gilson Serial Input/Output Channel (GSIOC). The GSIOC is a two-way communication interface between the computer and most Gilson modules.

Connecting GSIOC cable

Use the GSIOC cable, supplied in the accessory package, to link the VALVEMATE to other GSIOC modules. Refer to the diagram below.



Use the female connector, located individually at one end of the cable, to connect the GSIOC cable to another GSIOC cable in the system. Tighten the retaining screws.

Connect the other female connector, located on the same end as the male connector, to the VALVEMATE. Tighten the retaining screws.

Use the male connector to join another GSIOC cable and make the necessary connection to the next Gilson module.

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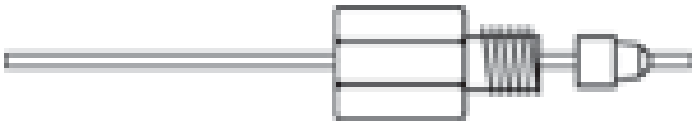
Plumbing Setup

If the valve is installed in your VALVEMATE, plumb the VALVEMATE into your system as required by your application. If a valve is not installed, refer to page 2-12.

Rheodyne valve. To make connections to the valve, use the Rheodyne fittings supplied with the valve to connect 1/16" OD (outer diameter) tubing to the valve ports.

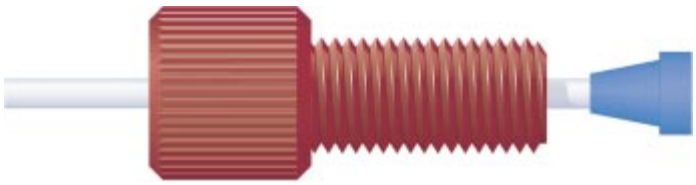
Slide the nut and ferrule onto the piece of tubing as shown below. Let the end of the tubing extend past the end of the ferrule.



When connecting the tubing to the port, make sure the tubing presses against the bottom of the port before you tighten the nut.

Hamilton valve. A Hamilton valve does not include fittings. The fittings you will use depend on the OD of the tubing being connected to the valve. Gilson supplies Upchurch flangeless nuts and ferrules for 1/8" and 1/16" OD tubing. See ***Appendix A*** for part numbers.

If you are using Upchurch flangeless fittings, slide the nut and ferrule onto the piece of tubing as shown below. Let the end of the tubing extend past the end of the ferrule.



When connecting the tubing to the port, make sure the tubing presses against the bottom of the port before you tighten the nut.

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Checking the VALVEMATE's Configuration

Refer to the following instructions if the VALVEMATE is being controlled via its RS-232 or GSIOC port.

Checking the Unit ID

The unit ID identifies the VALVEMATE when it is being externally controlled. For communication to occur, the VALVEMATE and the computer must "agree" on the same unit ID number. Refer to ***Appendix C, GSIOC Control*** for more information about the GSIOC.

At the factory, Gilson set the VALVEMATE's unit ID to 35. There is no need to change this number unless it conflicts with another unit's ID number. For example, if you had two VALVEMATEs connected along the GSIOC, assign one of them a different ID number.

To modify the unit ID assigned to the VALVEMATE:

1 Turn on the VALVEMATE.

2 Press the MODE key until you see the following message on the display:

Unit ID: 35

3 Use the up or down arrow key to select a different unit ID.

4 Press the MODE key to save the change.

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Checking the Baud Rate

Use the baud rate parameter to set rate for data communication between the VALVEMATE and a controlling device.

To modify the baud rate:

1 If necessary, turn on the VALVEMATE.

2 Press the MODE key until you see the following message on the display:

Baud Rate: External

If the VALVEMATE is controlled via the RS-232, change the baud rate to the value set for the controlling device. Valid baud rates are 9600 and 19200. Do not use External.

If the VALVEMATE is controlled via the GSIOC, make sure External is selected because the rate of transmission is clocked outside of the VALVEMATE. For example, if you connected the VALVEMATE to a 506C System Interface, choose External for the baud rate.

3 Press the MODE key to save the change.

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Valve Installation or Replacement

Follow these directions to replace the currently installed valve or to install a valve if it was not factory-installed by Gilson. VALVEMATE-compatible valves are listed in ***Appendix A***.

IMPORTANT! Valve installation and replacement is done with power turned ON to the VALVEMATE.

Before You Begin

Locate the following:

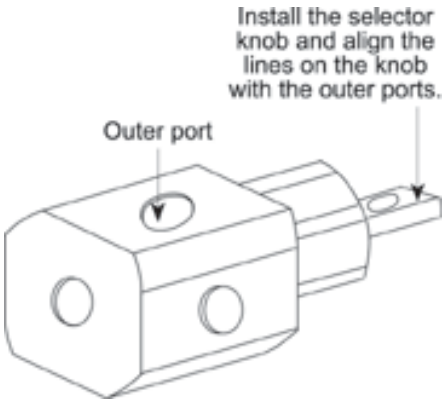
- replacement valve
- valve adapter - may have been factory-installed to the valve
- 7/64" Allen (or hex) wrench, supplied with the VALVEMATE

If the valve adapter is not installed, also locate the following:

- 9/64" Allen (or hex) wrench, supplied with a Rheodyne high-pressure valve, or the Gilson-manufactured adapter wrench supplied with the valve adapter for a Hamilton low-pressure valve.

Placing Replacement Valve In Its Home Position

Before you install the replacement valve, ensure that it is in its home position. Refer to the appropriate instructions.



Hamilton 86905 valve. To place this valve in its home position, do the following:

- With the selector knob installed, turn the selector knob and align the white lines on the knob with the outer valve ports.

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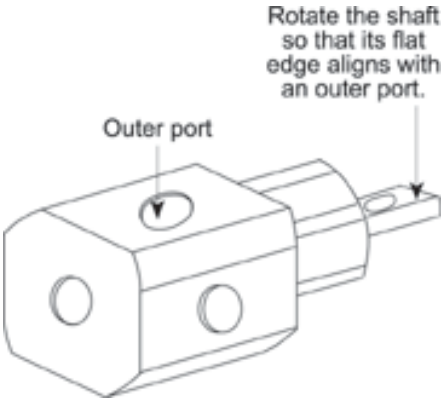
Hamilton 86913, 86915, or 86918 valve. To place the valve in its home position, do the following:

- With the selector knob installed, turn the selector knob and align the white line on the knob with a valve port.

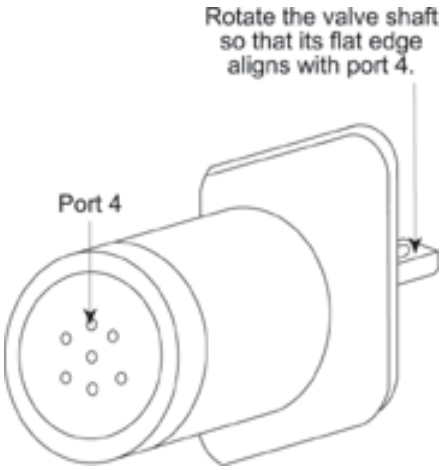
  If the selector knob is not installed, you can use an adjustable wrench to align the valve shaft's flat edge with an outer port.



Rheodyne 5011, 5012, 5031, 5032, 5041, or 5042 valve. To place the valve in its home position, do the following:

1 If the selector knob is installed, remove the knob by removing the screw that secures the knob to the valve.

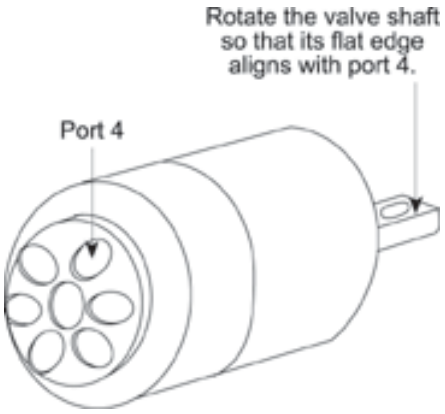
2 Use an adjustable wrench to align the valve shaft's flat edge with port 4.



Rheodyne 7000, 7010, 7030, 7040, 7710, 9010, 9030, or 9710 valve. To place the valve in its home position:

1 If the selector knob is installed, remove the knob by removing the screw that secures the knob to the valve.

2 Insert a hex wrench into the hole in the valve shaft and rotate the shaft until its flat edge is aligned with port 4. Or, for a 7710 or 9710 valve, use an adjustable wrench to align the valve shaft's flat edge with port 4.



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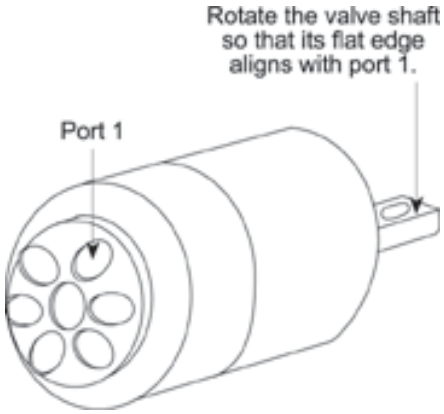
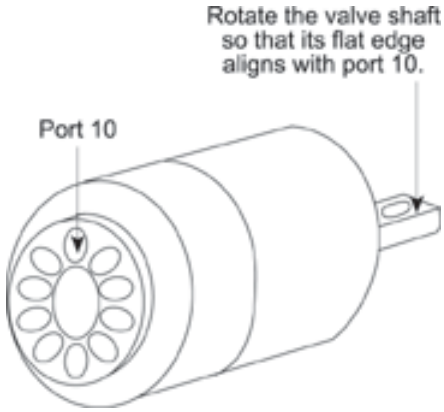


Rheodyne 7060 or 9060 valve. To place the valve in its home position:

1 If the selector knob is installed, remove the knob by removing the screw that secures the knob to the valve.

2 Insert a hex wrench into the hole in the valve shaft and rotate until the flat edge on the shaft is aligned with port 1.



Rheodyne 7610 valve. To place the valve in its home position:

1 If the selector knob is installed, remove the knob by removing the screw that secures the knob to the valve.

2 Insert a hex wrench into the hole in the valve shaft and rotate until the flat edge on the shaft is aligned with port 10.

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Attaching the Valve Adapter

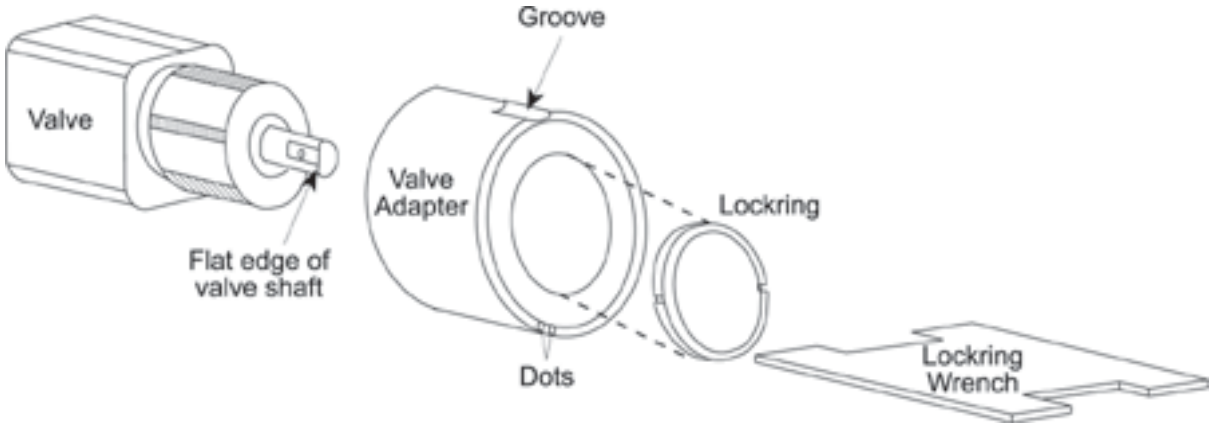
If a valve adapter is not attached to the valve, refer to the appropriate instructions.

Hamilton 86905, 86913, 86915, or 86918 valve. To attach the valve adapter:

1 If necessary, remove the selector knob by removing the screw that secures the knob to the valve.

2 Using the following diagram as a reference, install the valve adapter. When joining the adapter to the valve, ensure that:
- the valve adapter's groove faces upward
- the valve's flat edge faces the left and is perpendicular to the valve adapter's groove
- the one or more dots located above the valve adapter's flat edge face away from the valve. The adapter for the Hamilton 86905 valve has two dots while the adapter for the Hamilton 86913, 86915, or 86918 valve has one dot.

3 Tighten the lockring with the supplied lockring wrench.



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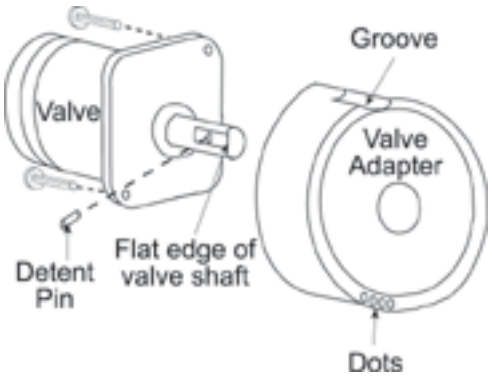


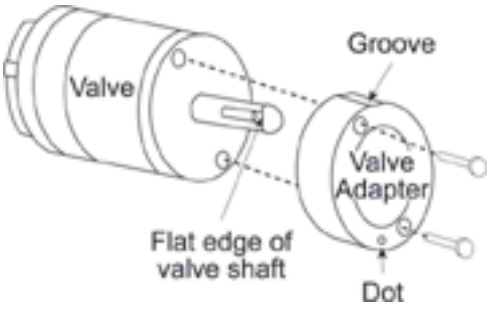
Rheodyne 5011, 5012, 5031, 5032, 5041, or 5042 valve. To attach the valve adapter:

1 Remove the plastic cover plate from the valve by removing the 2 screws that secure the plate to the valve.

2 Remove the detent pin from the valve shaft.

3 Refer to the following diagram to install the valve adapter. When installing the adapter to the valve, ensure that:
- the valve adapter's groove faces upward
- the valve's flat edge faces the left and is perpendicular to the valve adapter's groove
- the four dots, located above the valve adapter's flat edge, face away from the valve

4 To attach the valve and its adapter, insert and tighten the two flat-head screws supplied with the adapter.



Rheodyne 7000, 7010, 7030, 7040, 7710, 9010, 9030, 9060, or 9710 valve. To install the valve adapter:

1 Refer to the diagram to install the valve adapter. When installing the adapter to the valve, ensure that:
- the valve adapter's groove faces upward
- the valve's flat edge faces the left and is perpendicular to the valve adapter's groove
- the one dot, located above the valve adapter's flat edge, faces away from the valve

2 To secure the valve and adapter, insert and tighten the two socket-head screws supplied with the adapter.

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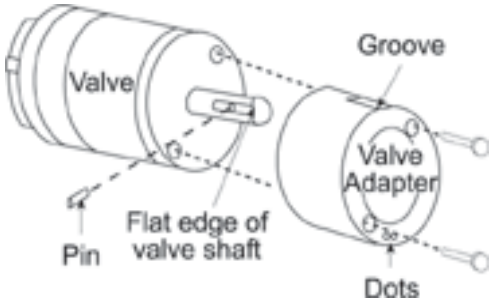
Rheodyne 7060 valve. To install the valve adapter:



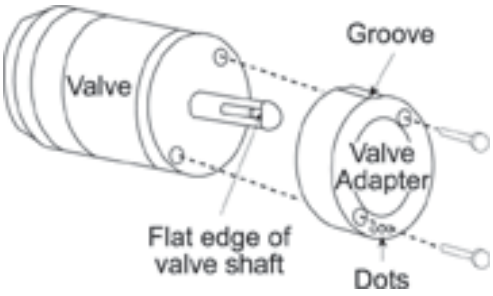
1 Remove the two screws that secure the plastic piece to the valve.

2 Remove the pin from the valve shaft.

3 Refer to the diagram to install the valve adapter. When installing the adapter to the valve, ensure that:
- the valve adapter's groove faces upward
- the valve's flat edge faces the left and is perpendicular to the valve adapter's groove
- the two dots, located above the valve adapter's flat edge, face away from the valve

4 To secure the valve and adapter, insert and tighten the two socket-head screws.

Rheodyne 7610 valve. To install the valve adapter:



1 Refer to the diagram to install the valve adapter. When installing the adapter to the valve, ensure that:
- the valve adapter's groove faces upward
- the valve's flat edge faces the left and is perpendicular to the valve adapter's groove
- the three dots, located above the valve adapter's flat edge, face away from the valve

2 To secure the valve and adapter, insert and tighten the two socket-head screws supplied with the adapter.

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Removing the Installed Valve

To remove the currently installed valve:

1 Turn off and then turn on the VALVEMATE to place the installed valve in its home position.

2 Turn the thumbscrew, located on the VALVEMATE's front panel, all the way to the left to loosen the valve.

3 Locate the two access holes on the right side of the VALVEMATE. Using the 7/16" Allen (hex) wrench take turns loosening the internal coupling screws. Just loosen the screws until the valve can be removed. **Do not over-loosen the screws.**

Selecting the Replacement Valve in the VALVEMATE Software

Before inserting the replacement valve:

1 Press MODE until the display shows the type of valve currently installed, its number of ports, and its number of positions.

2 Use the up or down arrow key to display the type of replacement valve.

3 Press MODE until the valve position display appears.

If a 2-position valve is installed, position 0 should display.

If a multi-position valve is installed, position 1 should display.

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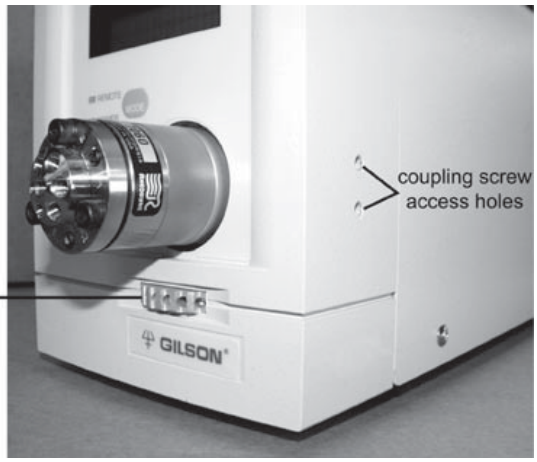
Installing the Replacement Valve

To install the replacement valve:

1 Insert the valve with the adapter's groove facing upward. This is the only position in which the VALVEMATE's coupler will accept the valve.

If necessary, loosen the coupling screws so the shaft can slide into the coupling. The coupling screws are accessed via the two access holes in the right side of the VALVEMATE.



2 Take turns tightening the internal coupling screws via the access holes in the right side of the VALVEMATE.

3 Insert the handle of the 7/16" Allen (hex) wrench into the hole in the thumbscrew and turn the thumbscrew to the right.

4 ENSURE THAT ALL TOOLS HAVE BEEN REMOVED FROM THE VALVEMATE.

5 Turn off then turn on power to the VALVEMATE.

6 Verify that the display correctly identifies the installed valve.

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Checking Valve Position and Liquid Flow

Refer to the appropriate procedures below.

Hamilton 86905 valve. To verify that the valve is properly installed:

1 Fill a syringe.

2 Connect the syringe to the top left-side port and dispense liquid into the port.

3 Verify that the liquid exits the top right-side port. If it does not, remove the valve, orient the valve in its home position, and install the valve again. (Refer to page 2-12.) Then repeat steps 1–3.

4 Press the up arrow key.

5 Dispense additional liquid into the top left-side port.

6 Verify that the liquid exits the bottom left-side port.

Hamilton 86913, 86915, or 86918 valve. To verify that the valve is properly installed:

1 Fill a syringe.

2 Connect the syringe to the center port and dispense liquid into the port.

3 Verify the liquid exits the right-side port. If it does not, remove the valve, orient the valve in its home position, and install the valve again. (Refer to page 2-13.) Then repeat steps 1–3.

4 Press the up arrow key.

5 Dispense additional liquid into the center port.

6 Verify that the liquid exits the port that is one position counterclockwise from the previous port.

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Rheodyne 5011, 5012, 7060, or 9060 valve. To verify that the valve is properly installed:

1 If the valve has a loop, remove the loop.

2 Fill a syringe.

3 Connect the syringe to the center port and dispense liquid into the port.

4 Verify that the liquid exits port 1. If it does not, remove the valve, orient the valve in its home position, and install the valve again. (Refer to pages 2-13 and 2-14.) Then repeat steps 1–4.

5 Press the up arrow key.

6 Dispense additional liquid into the center port.

7 Verify that the liquid exits port 2.

Rheodyne 5031, 5032, 7030, or 9030 valve. To verify that the valve is properly installed:

1 If the valve has a loop, remove the loop.

2 Fill a syringe.

3 Connect the syringe to port 2 and dispense liquid into the port.

4 Verify that the liquid exits port 1. If it does not, remove the valve, orient the valve in its home position, and install the valve again. (Refer to pages 2-13 and 2-14.) Then repeat steps 1–4.

5 Press the up arrow key.

6 Dispense additional liquid into port 2.

7 Verify that the liquid exits port 3.

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Rheodyne 5041, 5042, 7000, 7010, 7040, 7610, 7710, 9010, or 9710 valve. To verify that the valve is properly installed:

1 If the valve has a loop, remove the loop.

2 Fill a syringe.

3 Connect the syringe to port 2 and dispense liquid into the port.

4 Verify that the liquid exits port 3. If it does not, remove the valve, orient the valve in its home position, and install the valve again. (Refer to pages 2-13 and 2-14.) Then repeat steps 1–4.

5 Press the up arrow key.

6 Dispense additional liquid into port 2.

7 Verify that the liquid exits port 1.

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If You Turned Power OFF During Valve Replacement

If you turned power OFF during valve installation, the coupling inside of the VALVEMATE may rotate when you install the valve. This may make it difficult to locate and tighten the coupling screws, accessed via the holes on the right side of the VALVEMATE. If this occurs:

1 Remove the valve, if it is installed.

2 **ENSURE THAT ALL TOOLS HAVE BEEN REMOVED FROM THE VALVEMATE.**

3 Turn power on to the VALVEMATE. The coupling will move to its home position.

4 Install the valve again as described on pages 2-12 through 2-14.

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Operation 3

This section describes how to control the VALVEMATE. You can control the VALVEMATE using the front panel, contact closures, or Gilson Serial Input/Output Channel (GSIOC).

Note: If a Rheodyne 5000-series valve is installed in the VALVEMATE, check and if necessary, tighten the screws located on the front of the valve before each run. These screws may loosen over time causing fluid to leak.

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Front Panel Control

The VALVEMATE's front panel provides for complete valve control.

1	Display	The two 16-character lines show status, parameter, and error information.
2	REMOTE	This indicator illuminates when the VALVEMATE is being externally controlled via its RS-232 or GSIOC port.
3	POWER	This indicator illuminates when the rear panel MAINS switch is on.
4	MODE	Use this key to access the various modes: position, unit ID, baud rate, valve, and service.

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5	Up and down arrow keys	In position mode, use these keys to rotate the valve. For a multi-position valve, pressing the up arrow key turns the valve in a counterclockwise direction and pressing the down arrow key turns it in a clockwise direction. For a 2-position valve, pressing an arrow key turns the valve to its other position. In unit ID mode, use these keys to select a unit ID from 30 to 39. The default is 35. You need to change the VALVEMATE's unit ID if it and another VALVEMATE are being externally controlled via their GSIOC or RS-232 ports. In baud rate mode, use these keys to select among the following baud rates: 9600, 19200, or External. In valve mode, use these keys to identify the installed valve. See ***Appendix A*** for a list of valves. In the service mode, these keys are not used.

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Accessing Position Mode

Follow the instructions in ***Section 2*** to make connections to the VALVEMATE.

Press the rear panel MAINS switch. The power indicator on the front panel illuminates.

On the display, you see the model and version number of the VALVEMATE and a message indicating that the non-volatile memory is being checked:

VALVEMATE V1.11
Checking NV-RAM

If the VALVEMATE passes the software check, you see the following message:

VALVEMATE V1.11
System OK

Next you see a display indicating that the VALVEMATE is homing the installed valve, for example:

Rheodyne 7000
...Homing...

Then you see the valve type and its current position, for example:

Rheodyne 7000
Position 0 of 1

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Change Valve Position

If you want to change the position of the valve, press the up or down arrow key. For a multi-position valve, pressing the up arrow key turns the valve in a counterclockwise direction and pressing the down arrow key turns it in a clockwise direction. For a 2-position valve, pressing either arrow key turns the valve to its other position.

Continue to press an arrow key until the desired number is displayed after *Position*. Be aware that if you have a 2-position valve installed, its positions are referred to as 0 and 1.

If You See an Error

If an error message appears on the display, refer to ***Section 5***.

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Contact Closure Control

You can remotely control rotation of the valve by using the contact closure pins on the VALVEMATE's rear panel.

For making contact connections, refer to ***Section 2*** in this manual. You can simultaneously control two VALVEMATEs by connecting their inputs to the same outputs on the contact device.

For information on sending contact signals, refer to the information below and to the user's guide for the contact device.

When controlling a VALVEMATE using contacts, send pulse signals. These signals momentarily close (activate) and open (deactivate) a contact. The duration of the pulse must be at least 0.0017 minute (or 0.1 second).

Following are two examples for sending contact signals. These examples assume that the contact device's output 2 is connected to the VALVEMATE's CCW input.

Example 1: If your contact device can issue pulse signals, use the following example as a reference.

Time (min)	*Contact*	*Action*	*Description*
0.10	Output 2	Pulse	Pulses output 2. For a multi-position valve, turns the valve counterclockwise, e.g., to position 2 if it was in position 3. For a 2-position valve, turns the valve to its other position.

Example 2: If your contact device cannot issue pulse signals, use the following example as a reference:

Time (min)	*Contact*	*Action*	*Description*
0.10	Output 2	Close	Closes output 2.
0.11	Output 2	Open	Opens output 2. For a multi-position valve, turns the valve counter-clockwise, e.g., to position 2 if it was in position 3. For a 2-position valve, turns the valve to its other position.

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Maintenance 4

The VALVEMATE module was designed to require minimal maintenance. However, if you need to change the fuse(s), follow the instructions in this section.

If the installed valve should require maintenance, please refer to the instruction sheet supplied with the valve.

Note: If a Rheodyne 5000-series valve is installed in the VALVEMATE, check and if necessary tighten the screws located on the front of the valve before each run. These screws may loosen over time causing fluid to leak.

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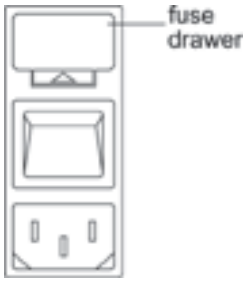
Replacing the Fuse(s)

A blown fuse may indicate the existence of another problem in the instrument. If the replacement fuses blow, do not try others.

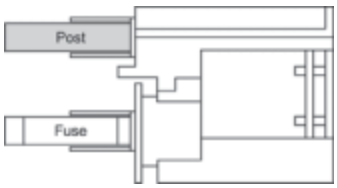
To change a fuse, follow these steps.

1 Disconnect the power cord from the power outlet and from the rear panel receptacle.

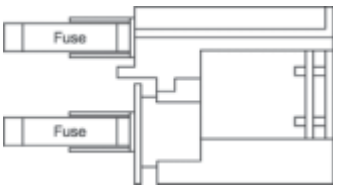


2 Locate the fuse drawer on the rear panel. See page 2-2 if necessary.

3 Insert a small screwdriver into the notch located below the fuse drawer.



Fuse installation for 100/120 voltage



Fuse installation for 220/240 voltage

4 Twist the screwdriver to open and remove the fuse drawer. The fuse drawer contains one 2.0A “T” Slo-Blo fuse (5 x 20 mm size) for a 100/120 voltage selection. It contains two 2.0A fuses for a 220/240 voltage selection.

5 Remove the old fuse(s) and insert the new fuse(s).

6 Insert the fuse drawer into its receptacle in the valve actuator.

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Troubleshooting 5

If you encounter a problem while operating the VALVEMATE, refer to the following pages. If you cannot solve or isolate the problem, contact Gilson or your local Gilson representative. See **Before Calling Us** on page 5-5.

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Error Messages

If an error message appears on the VALVEMATE, refer to the following table.

Error	*Description*	*Solution*
10	NV-RAM Error	There is a problem in the VALVEMATE software. Reset its parameters by turning OFF power. Then hold down the MODE key while turning ON power.
11	Position Error	The VALVEMATE is having difficulty rotating the valve. Try replacing the valve seal. Refer to the instruction sheet supplied with the valve.
12	Homing Error	The VALVEMATE cannot home the valve. Ensure that the appropriate valve is selected in the VALVEMATE software. Check that the valve is secure within the coupling and, if necessary, tighten the internal coupling screws via the side panel and tighten the front-panel thumbscrew. Turn power OFF then ON to the VALVEMATE.
14	Illegal Position	The VALVEMATE received a GSIOC command or input signal instructing it to turn the valve to an invalid position. Send the appropriate contact signal or GSIOC command.

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Troubleshooting

Power indicator not lighting and VALVEMATE not operating

- Make sure power is turned ON
- Check power cord connection
- Check for blown fuses

VALVEMATE making an erratic noise when moving the valve

- Ensure that the valve is secure within the coupling by checking that internal coupling screws, accessed through the side panel, and the front panel thumbscrew are tight
- The valve may not have been in home position when installed in the VALVEMATE. Remove the valve and use an adjustable wrench to place it in home position and then re-install the valve (refer to ***Section 2***)

Input functions not operating

- Make sure wire connections into the terminal block connector are secure
- Make sure the terminal block connector is securely seated in the VALVEMATE's input/output connector
- Check connections for proper pin assignments
- Check polarity of inputs; inputs should be contact closure
- Confirm that device supplying input to the VALVEMATE is turned ON and working properly
- Make sure that the pulse to the VALVEMATE is at least 0.1 second in duration

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Fluid flowing from wrong port or not flowing from any port

- The valve may be misaligned; turn power OFF then ON to the VALVEMATE
- The valve may not have been in home position when installed in the VALVEMATE; remove the valve and use an adjustable wrench to place it in home position then reinstall the valve (refer to ***Section*** 2)
- The wrong valve adapter may be attached to the valve; remove the valve and verify that the correct adapter is attached (refer to ***Section 2***)
- The valve may be incorrectly plumbed; refer to the instruction sheet supplied with the valve
- Fluid may not be reaching the valve; if connected to a pumping system, lower system pressure and disconnect the valve's inlet tubing to determine if fluid is reaching the valve

Low flowrate

- Check for leaks in tubing

High backpressure

- The valve may be incorrectly plumbed; refer to the instruction sheet supplied with the valve
- The valve may be clogged; remove the valve and clean it as described in the instruction sheet supplied with the valve

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Repair and Return Policies

Before Calling Us

Gilson Customer Service personnel will be able to serve you more efficiently if you have the following information:

- the serial number of the VALVEMATE
- the installation procedure you used
- list of concise symptoms
- list of operating procedures and conditions you were using when the problem arose
- list of other devices connected to the VALVEMATE and a description of those connections
- valve installed in the VALVEMATE
- list of other electrical connections in the room

Warranty Repair

Units covered under warranty will be repaired and returned to you at no charge. If you have any questions about applicability, please contact Gilson or your authorized representative.

Non-Warranty Repair

For out-of-warranty repairs, contact your local Gilson representative or the Gilson Customer Service Department. A Customer Service representative will discuss service options with you and can assist in making arrangements to return the equipment, if necessary.

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Rebuilt Exchange

For some units, rebuilt exchange components are available. Contact Gilson for details.

Return Procedure

In the United States, contact the Gilson Customer Service Department to obtain authorization before returning any Gilson equipment. To return a piece of equipment:

- Carefully pack the unit to prevent damage in transit. Check with Gilson regarding proper method of shipment. No responsibility is assumed by Gilson for damage caused by improperly packaged instruments. Indicate the authorization on the carton and on the packing slip.

- Always insure for the replacement value of the unit.

- Include a description of symptoms, your name, address, phone number, and purchase order to cover repair costs, return and shipping charges, if your institution requires it. Ship to:

  Gilson, Inc.
  Attention: Customer Service
  (indicate authorization here)
  3000 W. Beltline Highway
  Middleton, WI 53562

Outside the United States, contact your Gilson representative for return procedures.

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Replacement Parts and Accessories A

High-Pressure Valves, Stainless Steel

33035401	Rheodyne 7000 (2-Position, 6-Port) Switching Valve Assembly with attached mounting adapter and fittings
33035402	Rheodyne 7010 (2-Position, 6-Port) Injection Valve Assembly with attached mounting adapter and fittings
33035403	Rheodyne 7030 (2-Position, 6-Port) 3-Way Valve Assembly with attached mounting adapter and fittings
33035404	Rheodyne 7040 (2-Position, 6-Port) 4-Way Valve Assembly with attached mounting adapter and fittings
33035405	Rheodyne 7060 (6-Position) Selection Valve Assembly with attached mounting adapter and fittings
33035406	Rheodyne 7610* (2-Position, 10-Port) Switching Valve Assembly with attached mounting adapter and fittings *__Note__: If you are ordering the valve assembly directly from Rheodyne you must specify that you want a 7610-401 valve assembly
33035417	Rheodyne 7710 (2-Position, 6-Port) Injection Valve Assembly with attached mounting adapter and fittings

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High-Pressure PEEK Valves

33035407	Rheodyne 9010 (2-Position, 6-Port) Injection Valve Assembly with attached mounting adapter and fittings
33035408	Rheodyne 9030 (2-Position, 6-Port) 3-Way Valve Assembly with attached mounting adapter and fittings
33035409	Rheodyne 9060 (6-Position) 4-Way Valve Assembly with attached mounting adapter and fittings
33035418	Rheodyne 9710 (2-Position, 6-Port) Injection Valve Assembly with attached mounting adapter and fittings

Low-Pressure Teflon Valves

33035411	Rheodyne 5011 (6-Position) Selection Valve Assembly with attached mounting adapter and fittings
33035412	Rheodyne 5012 (6-Position) Selection Valve Assembly with attached mounting adapter and fittings
33035413	Rheodyne 5031 (2-Position, 6-Port) 3-Way Valve Assembly with attached mounting adapter and fittings
33035414	Rheodyne 5032 (2-Position, 6-Port) 3-Way Valve Assembly with attached mounting adapter and fittings
33035415	Rheodyne 5041 (2-Position, 6-Port) 4-Way Valve Assembly with attached mounting adapter and fittings
33035416	Rheodyne 5042 (2-Position, 6-Port) 4-Way Valve Assembly with attached mounting adapter and fittings

Low-Pressure Hamilton Valves

33035421	Hamilton 86905 HVX 4-4 (2-Position, 4-Port-Opposing) Valve Assembly with attached mounting adapter but without fittings; see **Note** on page A-5
33035422	Hamilton 86913 HVXD 4-5 (4-Position) Selection Valve Assembly with attached mounting adapter but without fittings; see **Note** on page A-5
33035423	Hamilton 86915 HVXD 6-5 (6-Position) Selection Valve Assembly with attached mounting adapter but without fittings; see **Note** on page A-5

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33035424	Hamilton 86918 HVXD 8-5 (8-Position) Selection Valve Assembly with attached mounting adapter but without fittings; see **Note** on page A-5

Replacement Valves

4967000	Rheodyne 7000 (2-Position, 6-Port) Switching Valve Assembly and fittings
496010	Rheodyne 7010 (2-Position, 6-Port) Injection Valve Assembly and fittings
4967030	Rheodyne 7030 (2-Position, 6-Port) 3-Way Valve Assembly and fittings
4967040	Rheodyne 7040 (2-Position, 6-Port) 4-Way Valve Assembly and fittings
4967060	Rheodyne 7060 (6-Position) Selection Valve Assembly and fittings
4967610	Rheodyne 7610* (2-Position, 10-Port) Switching Valve Assembly and fittings ***Note**: If you are ordering the valve assembly directly from Rheodyne you must specify that you want a 7610-401 valve assembly
4967710	Rheodyne 7710 (2-Position, 6-Port) Injection Valve Assembly and fittings
4969010	Rheodyne 9010 (2-Position, 6-Port) Injection Valve Assembly and fittings
4969030	Rheodyne 9030 (2-Position, 6-Port) 3-Way Valve Assembly and fittings
4969060	Rheodyne 9060 (6-Position) Selection Valve Assembly and fittings
4969710	Rheodyne 9710 (2-Position, 6-Port) Injection Valve Assembly with attached mounting adapter and fittings
4965011	Rheodyne 5011 (6-Position) Selection Valve Assembly and fittings

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4965012	Rheodyne 5012 (6-Position) Selection Valve Assembly and fittings
4965031	Rheodyne 5031 (2-Position, 6-Port) 3-Way Valve Assembly and fittings
4965032	Rheodyne 5032 (2-Position, 6-Port) 3-Way Valve Assembly and fittings
4965041	Rheodyne 5041 (2-Position, 6-Port) 4-Way Valve Assembly and fittings
4965042	Rheodyne 5042 (2-Position, 6-Port) 4-Way Valve Assembly and fittings
4973H42	Hamilton 86905 HVX 4-4 (2-Position, 4-Port-Opposing) Valve Assembly without fittings; see **Note** on page A-5
4973H44	Hamilton 86913 HVXD 4-5 (4-Position) Selection Valve Assembly without fittings; see **Note** on page A-5
4973H66	Hamilton 86915 HVXD 6-5 (6-Position) Selection Valve Assembly without fittings; see **Note** on page A-5
4973H88	Hamilton 86918 HVXD 8-5 (8-Position) Selection Valve Assembly without fittings; see **Note** on page A-5

Mounting Adapter Kits

33035431	Mounting Adapter Kit for Rheodyne 7000, 7010, 7030, 7040, 7710, 9010, 9030, 9060, or 9710 Valve
33035432	Mounting Adapter Kit for Rheodyne 7060 Valve
33035433	Mounting Adapter Kit for Rheodyne 7610 Valve
33035434	Mounting Adapter Kit for Rheodyne 5011, 5012, 5031, 5032, 5041, or 5042 Valve
33035437	Mounting Adapter Kit for Hamilton 86913, 86915, or 86918 Valve
33035438	Mounting Adapter Kit for Hamilton 86905 Valve
33035049	Lockring wrench for mounting adapter for Hamilton valve

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Accessories and Replacement Parts

495031	TFE tubing, 0.8 mm (0.03") ID x 1.5 mm (1/16") OD, package of 3 m (10 ft)
495033	TFE tubing, 0.5 mm (0.02") ID x 1.5 mm (1/16") OD, package of 3 m (10 ft)
495034	TFE tubing, 0.3 mm (0.01") ID x 1.5 mm (1/16") OD, package of 3 m (10 ft)
495032	TFE tubing, 0.3 mm (0.01") ID x 1.5 mm (1/8") OD, package of 3 m (10 ft)
49931109	Stainless steel tubing, 0.3 mm (0.01") ID x 1.5 mm (1/16") OD, 10 cm (3.9") long
49931509	Stainless steel tubing, 0.3 mm (0.01") ID x 1.5 mm (1/16") OD, 50 cm (19.5") long
49933109	Stainless steel tubing, 0.8 mm (0.03") ID x 1.5 mm (1/16") OD, 10 cm (3.9") long
49933209	Stainless steel tubing, 0.8 mm (0.03") ID x 1.5 mm (1/16") OD, 20 cm (7.8") long
49933309	Stainless steel tubing, 0.8 mm (0.03") ID x 1.5 mm (1/16") OD, 30 cm (11.7") long
49933509	Stainless steel tubing, 0.8 mm (0.03") ID x 1.5 mm (1/16") OD, 50 cm (19.5") long
49933609	Stainless steel tubing, 0.8 mm (0.03") ID x 1.5 mm (1/16") OD, 60 cm (23.4") long
49933809	Stainless steel tubing, 0.8 mm (0.03") ID x 1.5 mm (1/16") OD, 80 cm (31.2") long
49041011	Upchurch flangeless ferrule, 1.5 mm (1/16")
49041012	Upchurch flangeless nut, 1.5 mm (1/16")
49041015	Upchurch flangeless ferrule, 3 mm (1/8")
49041016	Upchurch flangeless nut, 3 mm (1/8")
496510	Rheodyne ferrule
496511	Rheodyne long nut
	Note: Fittings are not supplied with Hamilton valves. You can use Upchurch flangeless nuts and ferrules to make plumbing connections. Select the appropriate Upchurch fittings for the tubing being used.
7080316105	Power cord, 115V
7080316106	Power cord, 220V
36078143	Shielded GSIOC cable, 30 inches
6730204007	Fuse, 2.0 Amp “T” Slo-Blo, 5 x 20 mm
638304512	Terminal block connector
709910206	2-conductor cable, 6 ft.
334971	VALVEMATE OQ Test Kit

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Valve Flow Path Diagrams B

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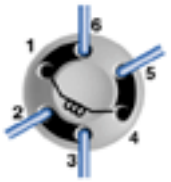
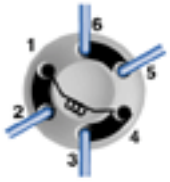
Rheodyne Valves

The following graphics are provided courtesy of Rheodyne, L.P.

33035401 Rheodyne 7000 (2-Position, 6-Port) Switching Valve Assembly with attached mounting adapter and fittings

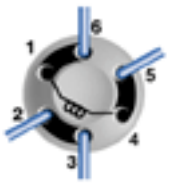


Position A (LOAD)

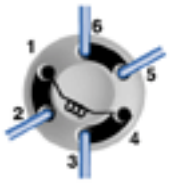


Position B (INJECT)

33035402 Rheodyne 7010 (2-Position, 6-Port) Injection Valve Assembly with attached mounting adapter and fittings

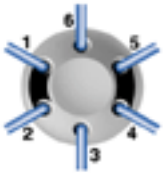


Position A (LOAD)



Position B (INJECT)

33035403 Rheodyne 7030 (2-Position, 6-Port) 3-Way Valve Assembly with attached mounting adapter and fittings



Position A

Position B

33035404 Rheodyne 7040 (2-Position, 6-Port) 4-Way Valve Assembly with attached mounting adapter and fittings

Position A

Position B

33035405 Rheodyne 7060 (6-Position) Selection Valve Assembly with attached mounting adapter and fittings

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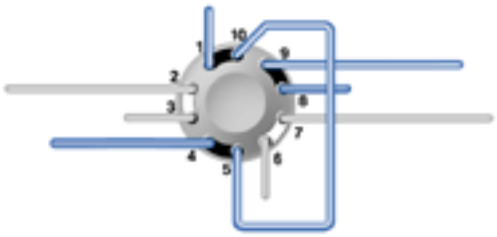
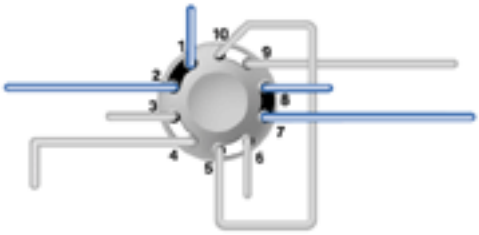
33035406 Rheodyne 7610* (2-Position, 10-Port) Switching Valve Assembly with attached mounting adapter and fittings *Note: If you are ordering the valve assembly directly from Rheodyne you must specify that you want a 7610-401 valve assembly

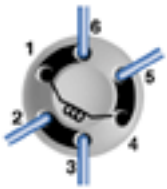


Position A (Forward Flow)



Position B (Reverse Flow)

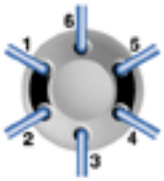
33035407 Rheodyne 9010 (2-Position, 6-Port) Injection Valve Assembly with attached mounting adapter and fittings



Position A (LOAD)

Position B (INJECT)

33035408 Rheodyne 9030 (2-Position, 6-Port) 3-Way Valve Assembly with attached mounting adapter and fittings



Position A

Position B

33035409 Rheodyne 9060 (6-Position) Selection Valve Assembly with attached mounting adapter and fittings

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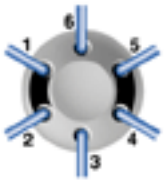
33035411 Rheodyne 5011 (6-Position) Selection Valve Assembly with attached mounting adapter and fittings

33035412 Rheodyne 5012 (6-Position) Selection Valve Assembly with attached mounting adapter and fittings

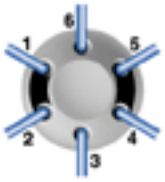
33035413 Rheodyne 5031 (2-Position, 6-Port) 3-Way Valve Assembly with attached mounting adapter and fittings



Position A

Position B

33035414 Rheodyne 5032 (2-Position, 6-Port) 3-Way Valve Assembly with attached mounting adapter and fittings



Position A

Position B

33035415 Rheodyne 5041 (2-Position, 6-Port) 4-Way Valve Assembly with attached mounting adapter and fittings

Position A

Position B

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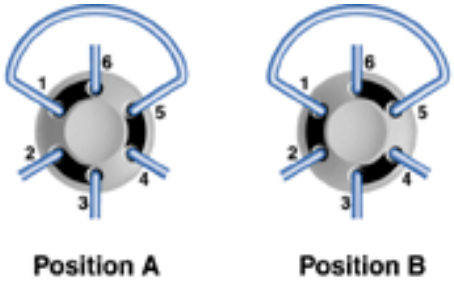
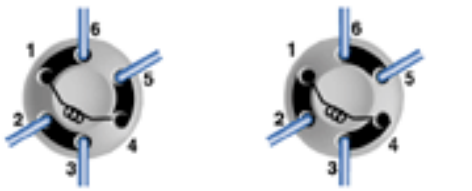
33035416 Rheodyne 5042 (2-Position, 6-Port) 4-Way Valve Assembly with attached mounting adapter and fittings

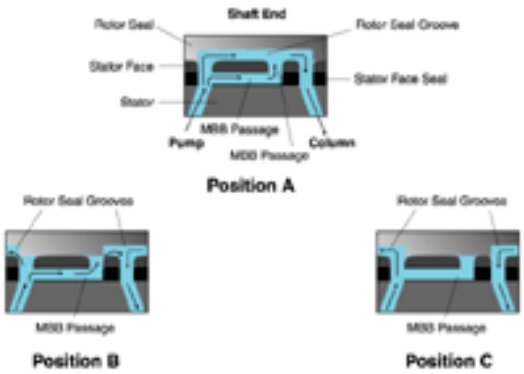


33035417 Rheodyne 7710 (2-Position, 6-Port) Injection Valve Assembly with attached mounting adapter and fittings



This valve incorporates Rheodyne's patented Make-Before-Break (MBB™) architecture allowing continuous flow between LOAD and INJECT positions which greatly reduces disruptive transient pressure shocks to your system.

The diagram at right illustrates the MBB valve design. In the LOAD position, mobile phase flow from pump port to column port travels through both the rotor seal groove and the MBB passage (Position A). As the rotor seal grooves rotate to change from LOAD to INJECT, there is continuous mobile phase flow through both one rotor seal groove and the MBB passage (Position B) until the rotation stops and both rotor seal grooves are connected by the loop. Sample flow begins through the loop to the column just as all flow stops through the MBB passage (Position C). Sample flow never enters the MBB passage.



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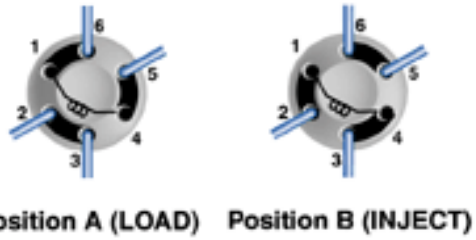
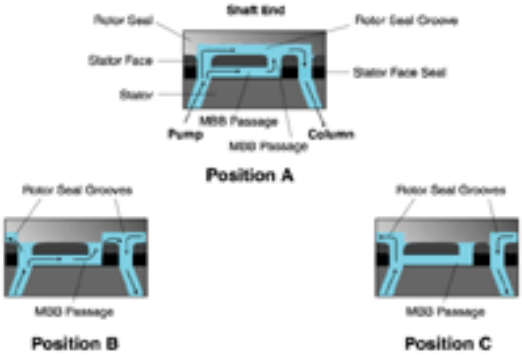
33035418 Rheodyne 9710 (2-Position, 6-Port) Injection Valve Assembly with attached mounting adapter and fittings



This valve incorporates Rheodyne's patented Make-Before-Break (MBB™) architecture allowing continuous flow between LOAD and INJECT positions which greatly reduces disruptive transient pressure shocks to your system.

The diagram at right illustrates the MBB valve design. In the LOAD position, mobile phase flow from pump port to column port travels through both the rotor seal groove and the MBB passage (Position A). As the rotor seal grooves rotate to change from LOAD to INJECT, there is continuous mobile phas flow through both one rotor seal groove and the MBB passage (Position B) until the rotation stops and both rotor seal grooves are connected by the loop. Sample flow begins through the loop to the column just as all flow stops through the MBB passage (Position C). Sample flow never enters the MBB passage.



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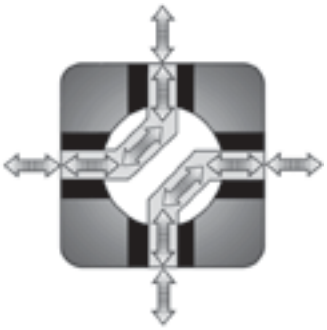
Hamilton Valves

The following graphics are provided courtesy of Hamilton Company.

33035421 Hamilton 86905 HVX 4-4 (2-Position, 4-Port-Opposing) Valve Assembly with attached mounting adapter but without fittings; see **Note** on page A-5



33035422 Hamilton 86913 HVXD 4-5 (4-Position) Selection Valve Assembly with attached mounting adapter but without fittings; see **Note** on page A-5

33035423 Hamilton 86915 HVXD 6-5 (6-Position) Selection Valve Assembly with attached mounting adapter but without fittings; see **Note** on page A-5

33035424 Hamilton 86918 HVXD 8-5 (8-Position) Selection Valve Assembly with attached mounting adapter but without fittings; see **Note** on page A-5

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GSIOC Commands C

GSIOC Control

The Gilson Serial Input/Output Channel (GSIOC) is a communications interface that enhances the power of your Gilson equipment.

The GSIOC incorporates a standard EIA RS-485 interface and allows 32 slave devices to be controlled from a single master controller in a multi-drop configuration. The controller is usually a computer.

Each slave device is identified by a unique number which must be known to the device and to the controller. The unit ID of the VALVEMATE is 35. But you can set its unit ID to another number. Refer to **Checking the VALVEMATE's Configuration** in ***Section 2*** for information on how to change the VALVEMATE's unit ID and the baud rate setting.

To control one or more VALVEMATEs via the GSIOC interface, you need the following.

- Personal computer
- RS-232 or GSIOC connection to the VALVEMATE
- Gilson control software or 706 Device Driver Software and your program

From the computer, you can do the following:

- Specify the VALVEMATE as the instrument that you want to control.

- Issue commands that set operating parameters, control operation, or request information from the VALVEMATE—see command list on the next page.

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GSIOC Commands

There are two kinds of commands that you can issue from the controller to the VALVEMATE.

- **Buffered commands (B)** send instructions to the VALVEMATE. These commands are executed one at a time. The VALVEMATE returns a period (.) to indicate that it accepted the buffered command.

- **Immediate commands (I)** request status information from the VALVEMATE. These commands are executed immediately, temporarily interrupting other GSIOC commands in progress, and return the requested information.

When issuing GSIOC commands to the VALVEMATE, separate the time points by at least 0.03 minute (or 1.8 seconds). For example:

Time (min)	*Unit ID*	*Command Type*	*Command*	*Description*
0.10	35	Buffered	2	Moves valve to position 2.
0.13	35	Buffered	3	Moves valve to position 3.

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Command	*Type*	*Description*
$	I	Resets the VALVEMATE software, saves how valve positions are being displayed (as numbers 1–8 or letters A–H), and rotates the valve to home position. Returns '$'.
%	I	Identifies the selected device. Returns 'VALVEMATEV*x.yz*', where *x*, *y*, and *z* indicate version number.
~9	B	Resets the information in the non-volatile memory (NV-RAM) to the following default values: Valve type: Rheodyne 7060 Unit ID: 35 Baud Rate: External
E	I	Returns one of the error codes listed below. Refer to ***Section 5*** for details on each error. 00 - No error 10 - NV-RAM checksum not matched 11 - Missing motor step 12 - Home position detection error 14 - Illegal position command
H	B	Moves valve to home position.
I	I	Reads status of input contacts. Returns 'ab' where: a - status of CW contact: 1 if closed (shorted), 0 if open. b - status of CCW contact: 1 if closed (shorted), 0 if open
K	I	Returns keycode for last three key presses. Response format: 'xxx' where xxx is an ASCII string of up to three characters encoding the keys pressed: M - MODE key U - Up arrow key D - Down arrow key If no key was pressed, returns '|'.
Kx	B	Simulates front panel keystrokes. Keystrokes are simulated according to the key assignments listed for the immediate K command.

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L	B	Locks the keypad.
Lx	B	Locks or unlocks the front panel depending on the value assigned to x: 0 - unlock front panel 1 - lock front panel
M	I	Reads the counter that tracks valve turns.
Mx	B	Sets the counter that tracks valve turns. Replace x with a number from 0 to 99999. For example, the command 'M0' sets the number to 0; you use this command after installing a new valve.
n	B	Changes the valve position display to numbers and moves the valve to the position n, where n is a number between 0 and 8.
N	I	Reads the counter that tracks the number of hours that either the VALVEMATE or a valve has been in use.
Nx	B	Sets the counter that tracks the number of hours that either the VALVEMATE or a valve has been in use. Replace x with a number from 0 to 99999. For example, the command 'N0' sets the number to 0; you can use this command after installing a new valve.
P	I	Identifies the current valve position. Returns 'sp', where s is status and p is position. s - 'P' for Parked, 'M' for Moving, or 'E' for Error p - 'A' to 'H'. For example, if the valve was in position A, the VALVEMATE returns 'PA'.
Px	B	Changes the valve position display to letters and moves the valve to the position set by x, where x is a letter between A and H. For example, if you want to go to position A, send the command PA.

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R	I	Returns the current valve position (0–8). For a 2-position valve, the first position is 0 and the second position is 1.
T	I	Returns 'xxPs-yyPt', xx is the number of positions and yy is the number of ports in the valve.
U	B	Unlocks the keypad.
V	I	Identifies the manufacturer and model of the installed valve. Returns 'an...n' where: a - first letter of the manufacturer name (R for Rheodyne or H for Hamilton) n...n - model number, for example, 7010 or 86905
W	I	Reads the display. Returns 'W0=x...x' for the upper line or 'W1=x...x' for the lower line, where x...x is the character string shown on the display. The immediate W command returns the line specified in the last-sent buffered Wn=x...x command. If a buffered Wn=x...x command has not been sent, the immediate W command returns the upper line. If the immediate command is sent again, it returns the lower line.
Wn=x..x	B	Disconnects the upper or lower display line from the VALVEMATE software and prints the character string designated by "x...x". The parameter n identifies the display line to disconnect: 0 - Disconnects upper display line 1 - Disconnects lower display line To reconnect the display, use the buffered Wn command.
Wn	B	Reconnects both or one of the display lines to the VALVEMATE software depending on the value assigned to n: 0 - Reconnects upper display line 1 - Reconnects lower display line If you omit the parameter n, both lines are reconnected, and the VALVEMATE software will display prompts and data.

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